1. Amount of glucose required to reduce the vapour pressure of 100 g water b. 0.2 mm of Hg is \( x \) g.

   Given that: vapour pressure of pure water = 54.2 mm of Hg. (Report your answer in nearest integer)

   Ans. (4)

   Sol. For a solution 

   \[
   \frac{m}{M} = \frac{N_A}{N} 
   \]

   \[
   54.2 \times \frac{x}{100} = 54 \times \frac{100}{18} \]

   \[
   \text{Amount of glucose} = \frac{200}{54} = 3.70 \ g \approx 4 \ g
   \]

2. A solution of 2 g glucose A in 1 mole of water is prepared. Find the mass % of A in solution. (Report your answer in nearest integer)

   Ans. (10)

   Sol. Mass % of A in solution = \( \frac{2 \times 100}{54} \) = 37.04% = 37% nearest

3. In which of the following processes, internal energy remains same at initial state and at final state?

   (1) Isothermal process
   (2) Adiabatic process
   (3) Isocronic process
   (4) Isobaric process

   Ans. (1)

   Sol. For isothermal process, temperature is constant and internal energy is function of temperature so \( \Delta T = 0 \) and \( \Delta U = 0 \). Here \( \Delta E \) remains constant in isothermal process.

4. Which one of the given following species has highest number of lone pairs of electron on central atom.

   \( \text{XeF}_4, \text{SO}_2, \text{I}_2, \text{K}_2 \text{Fe}_3 \)

   (1) \( \text{K}_2 \text{Fe}_3 \)
   (2) \( \text{SO}_2 \)
   (3) \( \text{I}_2 \)
   (4) \( \text{XeF}_4 \)

   Ans. (3)
5. 4 mole of P₄ + 8 mole of SOCl₂ → 4 mole of SO₄ + 4 mole of POCl₃

\[
\begin{align*}
\text{(1)} & \quad X \cdot Y \cdot Z = \text{POCl}_3, \quad Z = \text{SOCl}_2 \\
\text{(2)} & \quad X = 2 \cdot Y \cdot \text{POCl}_3, \quad Z = \text{SOCl}_2 \\
\text{(3)} & \quad X \cdot Y \cdot \text{POCl}_3, \quad Z = \text{SOCl}_2 \\
\text{(4)} & \quad X = 2 \cdot Y \cdot \text{POCl}_3, \quad Z = \text{SOCl}_2
\end{align*}
\]

Ans. (1)

Sol. 4 P₄ + 8 SOCl₂ → 4 SO₄ + 4 POCl₃ + 2 SOCl₂

6. For the given reaction

\[\text{A} + \text{B} \rightarrow \text{product}, \quad \text{rate} = k[A]^x[B]^y\]

\[
\begin{align*}
\text{Exp. No.} & \quad [A] & \quad [B] & \quad \text{Rate [Mole/liter sec]} \\
(1) & \quad 20 & \quad 0.5 & \quad 0.1 \\
(2) & \quad x & \quad 0.5 & \quad 0.4 \\
(3) & \quad 40 & \quad y & \quad 0.5 \\
(4) & \quad 20 & \quad y & \quad 2 \\
(5) & \quad 40 & \quad 50 & \quad 2
\end{align*}
\]

Ans. (2)
10. Calculate the magnetic moment (spin only) of respective complex \([\text{Fe(H}_2\text{O})_6]^{3+}\) and \([\text{Fe(CN)}_6]^{4-}\).

\[\begin{align*}
\text{Fe(H}_2\text{O})_6^{3+} & : & 1.96 \text{ BM} & & (1) \text{ 0.66 BM, 2.6 BM} \\
\text{Fe(CN)}_6^{4-} & : & 0.84 \text{ BM} & & (3) 1.73 \text{ BM, 2.6 BM}
\end{align*}\]

**Ans.**

11. How many of the following are intensive properties?

- Molar Gibb's free energy
- Molar mass
- Specific heat capacity
- Molar volume
- Molar density

**Ans.**

12. Find the ratio of de-Broglie wavelength of a proton and an electron. If their kinetic energies are same.

\[\text{Given that } (m_p = m_e = 1.68)\]

\[\begin{align*}
\text{Proton} & : & 1.43 \text{ nm} & & (1) 1.43 \text{ nm} \\
\text{Electron} & : & 2.6 \text{ nm} & & (2) 2.6 \text{ nm}
\end{align*}\]

**Ans.**

13. How much \(\text{H}_2\text{O}\) gas is evolved at STP when 2.4 g of \(\text{Mg} \) reacts with excess of \(\text{HCl}\).

\[\begin{align*}
\text{2.4 g of Mg} & : & 0.1 \text{ moles} & & (1) 2.4 \text{ L} \\
\text{0.1 moles HCl} & : & 0.1 \text{ moles} & & (3) 3.35 \text{ L}
\end{align*}\]

**Ans.**

14. Which of the following has lowest melting point?

- Na
- K
- Rb
- Cs

**Ans.**

**Sol.**

On moving down the group size of the kernel increases so metallic bond strength decreases and hence melting point decreases.
15. Which of the following resembles Freon?
   (1) CF₂Cl₂
   (2) CF₂
   (3) CF₃F
   (4) CF₃Cl

   Ans. (1)

   Sol. (Theory based) Freon is chloro fluoro carbons

16. Which of the following is not a hydrocarbon?
   (1) CH₃CH₂CH₂OH
   (2) CH₃CH₂CHO
   (3) CH₃CH₂CH₃
   (4) C₂H₆

   Ans. (1)

   Sol. (1) CH₃CH₂CH₂OH

17. Find the product y:
   (1) MgBr₂
   (2) MgBr
   (3) MgBr₂
   (4) MgBr₂

   Ans. (1)

   Sol. (1) MgBr₂

18. Which of the following will not give ppt with AgNO₃?
   (1) CH₃CH₂Br
   (2) CH₃CH₂Br
   (3) CH₃CH₂Br
   (4) CH₃CH₂Br

   Ans. (1)

19. Which of the following will not give ppt with Benedict solution?
   (1) Glucose
   (2) RNA
   (3) RNA
   (4) Glucose

   Ans. (4)

   Sol. Glucose is oxidized to gluconic acid and gives red ppt of Cu₂O with Benedict solution.

20. Statement-I: Nylon-6 is a polymer of caprolactam;
    Statement-II: LDPE is made using TiCl₄ and Al(III).
    (1) Both Statement I and Statement II are correct
    (2) Both Statement I and Statement II are incorrect
    (3) Statement I is correct but Statement II is incorrect
    (4) Statement I is incorrect but Statement II is correct

   Ans. (3)